DETAILED ACTION

Summary

1. This is the initial Office action based on the Biofuel Cell application filed on 12/28/2004.

2. Claims 1-22 are currently pending and have been fully considered.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

4. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
    (1) Field of the Invention.
    (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.

(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Drawings

5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the partitions of claim 3 that are preferably porous, electronically nonconductive, non-ion-selective partitions that are places substantially transverse to said electrodes must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

6. Claim 8 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 8 recites the limitation "A method according to claim 1, wherein for creating the anaerobic and aerobic zones, no separator is used." However, claim 1 claims the limitation of using a separator; therefore, claim 8 does not further limit the subject matter of claim 1.

7. Claims 19 and 20 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 19 and 20 claim structural limitations of a device depending off a method claim. This structure of claim 19 does not further limit the method of claim 16 and the structure of claim 20 does not further limit the method of claims 16 or 17.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 2 and 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to Claim 2, Applicant recites in claim 2, lines 3-5, "…each pair of electrodes comprising at least one anode and at least one cathode." A pair of electrodes consists of just two electrodes and the Examiner is unsure how a pair of electrodes can consist of more than one cathode and more than one anode. Furthermore, the applicant claims the limitation starting on line 10 of claim 2, wherein "…the open space of the first type of channel being in electrically conductive contact with the cathode and the open space of the second type of channel being in electrically conductive contact with the anode." The Examiner is unsure as to what "the open space" corresponds to and how an "open space" can be in electrically conductive contact with an anode and cathode. Claim 3 depends directly from claim 2 and is also found to be indefinite for containing the same limitations as described above.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1, 4-6, 9-11, 13-14 and 16-17 are rejected under 35 U.S.C. 102(b) as being anticipated by HABERMANN et al. (Applied Microbiology and Biotechnology: Biological Fuel Cells with Sulphide Storage Capacity).

As to Claim 1, HABERMANN et al. discloses a method for a modified fuel cell type for treating waste waters (pg. 132 and Fig. 5). An anode and cathode (pair of electrodes) present in the fuel cell are separated by a granulated slate solid electrolyte which is electrically non-conductive and is a cation/anion-exchanger membrane (non ion-selective partition wall) (pg. 132 and Fig. 5). The cathode is aerated with an oxidant (air) from the inside (pg. 132 and Fig. 5). In the operating state, waste-water passes through the polyelectrolyte (porous) (pg. 132 and Fig. 5). Oxygen is reduced on the cathode, forming water, while at the anode carbon dioxide is produced along with electricity (pg. 130, and Fig. 1).

As to Claim 9, the electrodes are inherently three-dimensional electrodes because only three physical dimensions are perceived on Earth, and since the electrodes are physically present, they occupy three-dimensions only.

As to Claim 10, the anode in the biofuel cell of HABERMANN et al. is a graphite anode (pg. 132).

As to Claim 11, HABERMANN et al. discloses active carbon cathodes that are employed for the method for a modified fuel cell type for treating waste waters (pg. 128, Summary and pg. 129, Electrolytes and electrodes).

As to Claim 13, HABERMANN et al. teaches of biofuel cells with biologically active anodes and active carbon cathodes which are capable of being operated with humus constituents as fuel (humic acid) (pg. 128, Summary).

As to Claim 14, HABERMANN et al. teaches that the cell is used for the determination and quantification of biological activity such as the TOC (total organic carbon) and COD (chemically oxygen demand) content in the degradation of waste waters with the fuel cell (pg. 132, Table 4).

As to Claim 16, HABERMANN et al. discloses a method according to claim 1, wherein a series of inorganic ions were used as cations, for example trace elements such as iron (pg. 129, Materials and methods).

As to Claim 17, HABERMANN et al. discloses an embodiment wherein fuel is fed into the anode where it reacts under anaerobic conditions (lack of air) producing decomposition products (Figure 4). Said decomposition products are led through the separator to the cathode where it can further react under aerobic conditions (in the presence of air).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over HABERMANN et al. (Applied Microbiology and Biotechnology: Biological Fuel Cells with Sulphide Storage Capacity) in view of RICHTER et al. (US Patent No. 4,126,934)

As to Claim 12, the disclosure of HABERMANN et al. as discussed above in claim 1 is incorporated herein. HABERMANN et al. does not expressly disclose the limitation of one or more of the electrodes provided with a precious metal catalyst.

However, RICHTER et al. teaches a biofuel cell which uses a thin and small electrode comprising a platinum alloy catalyst such as platinum-aluminum (col. 2, lines 22-33).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the biofuel cell of HABERMANN et al. with a platinum alloy catalyst

so as to minimize the size and weight of the electrode while maximizing the activity of the catalyst along with the mechanical integrity, as taught by RICHTER et al. (col. 1, line 64-col. 2, line 40).

15. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over HABERMANN et al. (Applied Microbiology and Biotechnology: Biological Fuel Cells with Sulphide Storage Capacity).

As to Claim 15, HABERMANN et al. discloses in a working example of the operation of a biofuel cell for three days at 28 °C. HABERMANN et al. does not expressly disclose the method of claim 1 which is carried out at a temperature of 30-100° C, preferably 40-60° C.

However, at the time of the invention, it would have been obvious to one of ordinary skill in the art to have the biofuel cell of HABERMANN et al. operate at a termperature of 30-100° C, preferably 40-60° C, because according to MPEP 2144.05, "a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985)." Furthermore, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "'Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.' *In re Aller*, 220 F.2d 454, 456,

105 USPQ 233, 235 (CCPA 1955) (MPEP 2144.05)." Furthermore, "a particular parameter must first be recognized as a result-effective variable, i.e. a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (MPEP 21440.05)."

16. Claims 1, 2, 4-7, 9, 10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al. (EP 0827229 A2) in view of CHAO et al. (US Patent No. 4,581,105).

As to Claims 1, 4-7 and 21, KIM et al. discloses the method for conversion of waste water (organic waste) (pg. 4, lines 51-56). The waste is introduced into the cell which comprises an anode compartment and cathode compartment separated by a sintered glass separator (pg. 5, lines 18-19 and Fig. 1). As shown in Figure 1, air (oxidizer) is fed into the portion of the cell around the cathode, and a potential difference is formed across said pair of electrodes (Figure 1) and carbon dioxide is inherently produced at the anode and electricity is produced. KIM et al. also discloses a kit for processing organic waste comprising an anode and cathode (three dimensional electrodes) wherein the electrodes can be graphite felt electrodes (pg. 5, lines 14-17). KIM et al. does not expressly disclose that the sintered glass separator is a porous, electronically non-conductive, non ion-selective partition wall.

However, CHAO et al. teaches that separators may be used in electrochemical cells (i.e. fuel cells) to separate the anode from the cathode (col. 5, line 67 to col. 6, line 1). CHAO et al. further teaches that the separator is preferably permeable to the electroactive species

and preferably completely chemically and physically stable in the cell environment (col. 6, lines 7-10). Suitable separators include sintered glass, inorganic ion-exchange membranes, and woven and non-woven fabrics made from fiberglass (col. 6, lines 10-14). At the time of the invention, a person having ordinary skill in the art would have been motivated to substitute a non-woven fiberglass separator (porous, electronically non-conductive, non ion-selective partition wall) for the sintered glass separator of KIM et al. because the two are known substitutes which provide for good separation of the anode and cathode in a fuel cell so as to reduce the rate of flow of electroactive species and electrochemical products, thus minimizing the reconversion of electrochemical products, as taught by CHAO et al. (col. 5, line 67 to col. 6, line 4). It would have been obvious that the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. CHAO et al. recognizes that sintered glass separators are equivalent to woven and non-woven fabrics such as fiberglass that can be used as a separator in an electrochemical cell between and anode and a cathode.

With respect to claim 2, KIM et al. as modified by CHAO et al. does not disclose two or more pairs of electrodes. However, it is known in the fuel cell art to have two or more pairs of electrodes stacked in series to increase the voltage output. It would have therefore been obvious to one of ordinary skill in the art to duplicate the fuel cell unit of KIM in order ot increase voltage output. When the glass mat separator is used, there are inherently channels on each outer surface of the glass mat separator facing each of the respective electrodes.

As to Claim 9, the electrodes are inherently three-dimensional electrodes because only three physical dimensions are perceived on Earth, and since the electrodes are physically present, they occupy three-dimensions only.

17. Claims 1, 2, 4-7, 9-10, 17 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al. (WO 01/04061 A1) in view of CHAO et al. (US Patent No. 4,581,105).

As to Claims 1, 4, 7 and 21, KIM et al. ('061) discloses the method for the conversion of waste water (organic waste) wherein the waste water is introduced as a fuel into a biofuel cell consisting of a pair of electrodes (anode and cathode) and having an oxidizer introduced into the cathodic compartment and producing electricity and CO_2 off gas (Claim 4). KIM et al. ('061) discloses a cation exchange membrane used to separate the anode from the cathode and does not expressly disclose a porous, electronically non-conductive, non ion-selective partition wall used to separate the anode and cathode. However, CHAO et al. teaches that separators may be used in electrochemical cells (i.e. fuel cells) to separate the anode from the cathode (col. 5, line 67 to col. 6, line 1). CHAO et al. further teaches that the separator is preferably permeable to the electroactive species and preferably completely chemically and physically stable in the cell environment (col. 6, lines 7-10). Suitable separators include sintered glass, inorganic ion-exchange

membranes (cation exchange membrane of KIM et al. ('061)) and woven and non-woven fabrics made from fiberglass (col. 6, lines 10-14).

At the time of the invention, a person having ordinary skill in the art would have been motivated to substitute a non-woven fiberglass separator for the cation exchange membrane of KIM et al. ('061) because the two are known substitutes which provide for good separation of the anode and cathode in a fuel cell so as to reduce the rate of flow of electroactive species and electrochemical products, thus minimizing the reconversion of electrochemical products, as taught by CHAO et al. (col. 5, line 67 to col. 6, line 4). It would have been obvious that the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. CHAO et al. recognizes that ion-exchange materials are equivalent to woven and non-woven fabrics such as fiberglass that can be used as a separator in an electrochemical cell between and anode and a cathode.

With respect to claim 2, KIM et al. ('061) as modified by CHAO et al. does not disclose two or more pairs of electrodes. However, it is known in the fuel cell art to have two or more pairs of electrodes stacked in series to increase the voltage output. It would have therefore been obvious to one of ordinary skill in the art to duplicate the fuel cell unit of KIM et al. ('061) in order to increase voltage output. When the glass mat separator is used, there are inherently channels on each outer surface of the glass mat separator facing each of the respective electrodes.

As to Claims 5-6, KIM et al. ('061) discloses the oxidizer of claim 1 as being air, containing oxygen (pg. 6, lines 5-9).

As to Claim 9, the electrodes are inherently three-dimensional electrodes because only three physical dimensions are perceived on Earth, and since the electrodes are physically present, they occupy three-dimensions only.

As to Claim 10, KIM et al. ('061) discloses that the cathode and anodes of the biofuel cell consist of a graphite felt (pg. 5, lines 29-31).

As to Claim 17, KIM et al. ('061) discloses that starch wastewater and an anaerobic sludge is used in the anodic compartment of the biofuel cell where electrochemically active bacteria produce electric current while using the organic substances in wastewater as a fuel (pg. 6, lines 22-24). The cation produced from the anodic compartment is passed through the separator membrane which divides the anode from the cathode, and arrives at the cathode (pg. 6, lines 25-29). The cation is converted into water in the presence of oxygen, allowing electric current to be continuously produced (pg. 6 lines 30-33).

18. Claims 11 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al. (WO 01/04061 A1) in view of CHAO et al. (US Patent No. 4,581,105) as applied to claim

1 above, and further in view of HABERMANN et al. (Applied Microbiology and Biotechnology: Biological Fuel Cells with Sulphide Storage Capacity).

As to Claim 11, the disclosure of KIM et al. ('061) in view of CHAO et al. as discussed in claim 1 above is incorporated herein. The combination of KIM et al. ('061) and CHAO et al. does not expressly disclose one or more electrodes comprising active carbon.

However, HABERMANN et al. discloses active carbon cathodes that are employed for the method for a modified fuel cell type for treating waste waters (pg. 128, Summary and pg. 129, Electrolytes and electrodes). At the time of the invention, a person having ordinary skill in the art would have found it obvious to activate the graphite felt cathode in the biofuel cell of KIM et al. ('061) and CHAO et al. so that the fuel cell is capable of continuous energy consumption using humus constituents or sugar waste as a fuel for over a period of five years without malfunction and maintenance, and purifying the waste water while producing energy, as suggested by HABERMANN et al. (Pg. 128, Summary).

As to Claim 14, HABERMANN et al. teaches that the cell is used for the determination and quantification of biological activity such as the TOC (total organic carbon) and COD (chemically oxygen demand) content in the degradation of waste waters with the fuel cell (pg. 132, Table 4). At the time of the invention, a person having ordinary skill in the art would have found it obvious to employ the biofuel cell of KIM et al. ('061) and CHAO et

al. as a sort of biosensor to determine and quantify biological activity within the cell such as COD and TOC content, as taught by HABERMANN et al. (pg. 132, Table 4).

As to Claim 15, HABERMANN et al. discloses in a working example of the operation of a biofuel cell for three days at 28 °C (pg. 132, col. 2). HABERMANN et al. does not disclose the method of claim 1, which is carried out at a temperature of 30-100° C, preferably 40-60° C.

However, at the time of the invention, it would have been obvious to one of ordinary skill in the art to have the biofuel cell of KIM as modified by CHAO and HABERMANN et al. operate at a temperature in the range of 40-60° C because, according to MPEP 2144.05, "a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985)." Furthermore, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "'Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.' *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (MPEP 2144.05)." Furthermore, "a particular parameter must first be recognized as a result-effective variable, i.e. a variable which achieves a recognized result, before the determination of the optimum or workable

ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (MPEP 21440.05)."

As to Claim 16, HABERMANN et al. discloses a method according to claim 1, wherein a series of inorganic ions were used as cations, for example trace elements such as iron (pg. 129, col. 2). At the time of the invention, a person having ordinary skill in the art would have been motivated to modify the fuel of KIM ('061) as modified by CHAO and HABERMANN et al. with trace elements of iron as cations so that the demands for energy and nutrients can be met, as taught by HABERMANN et al. (pg. 129, col. 2).

19. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al. (WO 01/04061 A1) in view of CHAO et al. (US Patent No. 4,581,105) as applied to claim 1 above, and further in view of RICHTER et al. (US Patent No. 4,126,934).

As to Claim 12, the disclosure of KIM et al. ('061) and CHAO et al. as discussed above in claim 1 is incorporated herein. The combination of KIM et al. ('061) and CHAO et al. does not expressly disclose the limitation of one or more of the electrodes provided with a precious metal catalyst.

However, RICHTER et al. teaches a biofuel cell which uses a thin and small electrode comprising a platinum alloy catalyst such as platinum-aluminum (col. 2, lines 22-33).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the biofuel cell of KIM et al. ('061) in view of CHAO et al. with a platinum alloy catalyst so as to minimize the size and weight of the electrode while maximizing the

activity of the catalyst along with the mechanical integrity, as taught by RICHTER et al. (col. 1, line 64-col. 2, line 40).

20. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al. (WO 01/04061 A1) in view of CHAO et al. (US Patent No. 4,581,105) as applied to claim 1 above, and further in view of HERTL et al. (US Patent No. 4,578,323).

As to Claim 13, the combination of KIM et al. ('061) and CHAO et al. does not expressly disclose the method according to claim 1, wherein one or more electrodes are provided with humic acid and/or anthraquinone-disulfonic acid.

However, HERTL et al. teaches a fuel cell which used suitable fuel solutions that comprise effective amounts of an electron-accepting quinone compound such as anthraquinone-2, 6-disulfonic acid. HERTL et al. further teaches that this compound is electrochemically reversibly and photoactive (col. 3, lines 37-48). At the time of the invention, a person having ordinary skill in the art would have found it obvious to use a fuel solution comprising effective amounts of anthraquinone-2, 6-disulfonic acid into the biofuel cell of KIM et al. ('061) and CHAO et al. so as to provide a provide a biofuel cell with a successful electron mediator, as taught by HERTL (col. 2, lines 46-56).

21. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al. (WO 01/04061 A1) in view of CHAO et al. (US Patent No. 4,581,105) as applied to claim 1 above, and further in view of YAMAMOTO (US Patent No. 4,883,724).

The disclosure of KIM et al. ('061) in view of CHAO et al. as discussed above in claims 1 and 21 is incorporated herein. The combination of KIM et al. ('061) and CHAO et al. does not expressly disclose the limitation of a means for discharging or storing electricity and provided with supply means for an oxidizer, preferably in the form of an air pump. However, YAMAMOTO teaches a hybrid fuel cell system which comprises a storage battery (Abstract). An auxiliary controller for the fuel cell and an output current controller for controlling the output current drawn form the fuel cell is provided so that the storage battery can be charged for recovery within the shortest possible time (Abstract). YAMAMOTO also teaches a supply air blower **9** for providing air to the fuel cell **3** (col. 3, line 55-col. 4, line 5 and Figure 1).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the biofuel cell device of KIM et al. ('061) and CHAO et al. with an air blower so as to effectively provide the fuel cell with air, as taught by YAMAMOTO et al. (col. 3, line 55-col. 4, line 5 and Figure 1). Also, a person having ordinary skill in the art would have been motivated to incorporate a storage battery so that the biofuel cell system can be useful as a power supply in applications subject to sudden load fluctuations in power demand, as suggested by YAMAMOTO (Abstract).

22. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al. (WO 01/04061 A1) in view of CHAO et al. (US Patent No. 4,581,105) and YING et al. (US Patent No. 6,183,901 B1).

As to Claim 22, the disclose of KIM et al. ('061) in view of CHAO et al. as discussed above for claims 1 and 22 are incorporated herein. KIM in view of CHAO et al. does not expressly disclose the limitation of a kit for processing organic waste wherein the partition wall is of polyurethane foam.

However, YING et al. teaches a separator for a fuel cell which employs a protective coating layer comprising suitable polymers such as polyurethanes (col. 13, lines 52-59).

At the time of the invention, a person having ordinary skill in the art would have been motivated to modify the separator of the biofuel cell of KIM et al. ('061) and CHAO et al. with a polyurethane protective coating so as to obtain an increase in toughness and flexibility without having a negative impact on the desired separator properties, as taught by YING et al. (col. 13, lines 60-65).

Conclusion

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 8am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA
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